Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Plasma Excitations in Graphene: Their Spectral Intensity and Temperature Dependence in Magnetic Field JHAO-YING WU, SZU-CHAO CHEN, GODFREY GUMBS, MING-FA LIN — We calculated the dielectric function, the loss function, the magnetoplasmon dispersion relation and the temperature-induced transitions for graphene in a uniform perpendicular magnetic field. The calculations were performed using the Peierls tight-binding model to obtain the energy band structure and the random-phase approximation to determine the collective plasma excitation spectrum. The single-particle and collective excitations have been precisely identified based on the resonant peaks in the loss function. The critical wave vector at which plasmon damping takes place is clearly established. This critical wave vector depends on the magnetic field strength as well as the levels between which the transition takes place. The temperature effects were also investigated. At finite temperature, there are plasma resonances induced by the Fermi distribution function. Whether such plasmons exist is mainly determined by the field strength, temperature, and momentum.

Jhao-Ying Wu
Department of Physics, National Cheng Kung University

Date submitted: 24 Nov 2010 Electronic form version 1.4